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10/577,429	04/27/2006	Do-Hyung Kim	P0777	4724

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EXAMINER	
COX, ALEXIS K	
ART UNIT	PAPER NUMBER
3744	
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/577,429	KIM, DO-HYUNG	
	Examiner	Art Unit	
	ALEXIS K. COX	3744	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☐ Responsive to communication(s) filed on _____.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-35* is/are pending in the application.

4a) Of the above claim(s) *29-35* is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-28* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *27 April 2006* is/are: a)☒ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *8/14/2008, 5/07/2007*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Claims 29-35 are withdrawn from further consideration pursuant to 37 CFR 1.142(b), as being drawn to a nonelected group, there being no allowable generic or linking claim. Applicant timely traversed the restriction (election) requirement in the reply filed on 11/24/2008.

Information Disclosure Statement

Regarding the IDS, the referenced US patent No. 4,326,874 was invented by Burklin, rather than Sisk. As the patent number referenced also lacks relevance to the application, it is requested that correction to patent no. 4,236,874 be made.

Claim Objections

2. Claims 1 and 2 are objected to because of the following informalities:

Regarding claims 1 and 2, the term "cooling capacity of a compressor" on line 3 of claim 1 and lines 3 and 6 of claim 2 should be changed to "cooling capacity of a cooling cycle" and cooling capacity of the cooling cycle" according to the requirements of antecedent basis as compressors have compression capacity, not cooling capacity.

Further regarding claim 2, and regarding claims 3, 7, 11, 12, the terms "clockwise" and "counterclockwise" are irrelevant without a set direction from which to view the compressor. Alteration to "a first direction" and "a second direction" is suggested.

Regarding claim 3, the term "the temperature" on line 3 should be changed to "a temperature" and the term "every pre-set time" should be changed to "a pre-set time" to increase the clarity of the claim.

Regarding claim 6, the step "after the rotation direction of the compressor is sensed" (lines 2-3) cannot take place, as there has been no sensing of the rotation direction of the compressor.

Regarding claim 7, the "operation mode of the refrigerator selected by the user" (lines 2-3) takes place in claim 4. As claim 7 is dependent on claim 3 and not claim 4, this step cannot take place. Further, alteration of "the pre-set temperature" to "the pre-set defrosting temperature" is suggested to increase the clarity of the claim.

Regarding claim 11, "the refrigerant seal amount" on lines 1-2 should be changed to "a refrigerant seal amount", and "a refrigerator of the compressor" on line 3 should be changed to "a refrigerant of the cooling system." Appropriate correction is required.

Regarding claims 12-28, it is suggested that the claims be examined for further informalities of the same nature as those mentioned regarding claims 1-11.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claim 3 is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 3, "the process of stopping or rotating the compressor counterclockwise at every pre-set time" is not a logical limitation, as the terms "clockwise" and "counterclockwise" vary according to the viewpoint of the speaker relative to the compressor in question. For the purpose of examination, the examiner is interpreting the intended meaning to be that the step of determining which mode the compressor should be operated in, whether in the first direction, the second direction, or stopped, occurs at a pre-set time interval. As this is neither precisely in the specification nor the claims, but the most logical explanation for the wording in the specification the examiner has been able to determine, correction to the actual intended meaning is welcomed.

Regarding claim 5, the limitation "a value of a current applied to the compressor" is insufficiently specific, as frequency, presence, amperage, voltage, and resistance may all be considered values of a current. As claim 5 regards a method, it is entirely possible to have the opposite effect of that intended by measuring a different value than that intended. It is therefore in the best interest of the applicant to further clarify the claim.

Regarding claims 11 and 12, the term "refrigerant seal amount" is not one generally recognized in the art, and although the applicant may act as their own lexicographer, this requires explicit definitions of new terms.

Regarding claim 12, it is unclear as to whether there is to be a new refrigerant seal amount set every time the temperature at the entrant of the evaporator and the

temperature of the evaporator itself are equal, or if this is to happen a single time as is implied by page 27 of the specification, or if there is some other criterion being applied.

Regarding claims 27 and 28, it is unclear as to whether the compressor is to be rotated counterclockwise at every pre-set period continuously until the temperature inside the refrigerator reaches the temperature set by the user, or if it is to be rotated counterclockwise in alternating pre-set times as is implied but not required by claim 27, line 4. It is further unclear whether the stopping of the compressor in line 4 of claim 27 is to be between the first rotational direction and the second rotational direction, or after the end of the rotation in the second direction, or both.

Claim Rejections - 35 USC § 102

5. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

6. Claims 1-3 are rejected under 35 U.S.C. 102 (b) as being anticipated by Loprete et al (US Patent No. 6,591,621).

Regarding claims 1 and 2, Loprete et al discloses a method for controlling an operation of a compressor of a cooling system comprising varying a cooling capacity of the cooling system a compressor is installed in by controlling a rotation direction of the compressor (see column 4 lines 38-44) according to a load condition of the refrigerator,

wherein the cooling capacity of the system increases when the compressor is rotated clockwise and decreases when the compressor is rotated counterclockwise.

Regarding claim 3, Loprete et al discloses the use of load matching for fewer and shorter defrost cycles (see column 26 lines 51-52). This must comprise a step in which when the temperature inside the refrigerator and a pre-set defrosting temperature are identical, a defrosting operation is performed, as otherwise it is not load-matching. Further, as the temperature inside the refrigerator is greater following a defrosting cycle and the compression ratio is greater when rotated in the first direction, rotating the compressor in the first direction when the defrosting operation is terminated is also part of load-matching. Further, the system of Loprete is controlled by a thermostat (228, see column 25 lines 13-17), and the thermostat cited is programmable; as it is digital, it must have some defined sampling period, and therefore it must therefore reassess the required compressor settings at pre set time intervals.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

8. The factual inquiries set forth in *Graham* **v.** *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.

2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

9. Claims 4-28 are rejected under 35 U.S.C. 103 (a) as being unpatentable over Loprete et al (US Patent No. 6,591,621).

Regarding claims 4 and 7, Loprete explicitly discloses the coordination of a rotation direction and amount of the compressor with the amount of cooling air supply (see column 25 lines 13-17 and column 4 lines 38-44). It is noted that Loprete et al does not explicitly disclose the selection of an operation mode of the cooling system by a user. However, it falls within the realm of common knowledge to permit user programming of a thermostat in order to permit timed temperature control of a home, and it would have been obvious to one of ordinary skill in the art at the time of the invention to use a user-programmable thermostat in the system of Loprete et al in order to permit timed temperature control of a refrigerator according to user-specific load patterns.

Regarding claims 5, 6, and 15, regardless of which direction the compressor is rotated in it is according to the operation mode of the refrigerator. Additionally, any electrical motor is controlled according to the presence of a reference current value, because all electrical motors have a minimum current to be "on," below which they are "off." Further, Loprete discloses the implementation of turning off the compressor for a predetermined time period before running it in the reverse the previous direction, so as not to damage the motor and waste energy (see column 22 lines 4-9).

Regarding claims 8-10, it is noted that Loprete does not explicitly disclose the setting of an operation range of a temperature sensor for sensing the temperature inside the refrigerator according to the rotation direction of the compressor. However, it falls within the realm of common knowledge as mechanically expedient to calibrate sensors to the sensitivity most suited to the application at hand, and it would have been obvious to one of ordinary skill in the art at the time of the invention to program the thermostat of Loprete et al to have a higher sensitivity when running the compressor in reverse, as it would be less likely to inappropriately overreact at the slower potential rate of change in temperature available from the lower capacity of the compressor. Further, the selection of the appropriate temperature ranges according to various system compressor capacities are a matter of routine experimentation, and therefore would have been obvious to one of ordinary skill in the art to implement in order to optimize the efficiency of the system.

Regarding claims 11 and 12, the examiner interprets the intent of the claims to be to set the amount of refrigerant required in the system according to the amount necessary when the compressor runs at the lower capacity. As it falls within the realm of common knowledge as mechanically expedient to avoid damage to systems by providing for the worst case scenario, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the appropriate amount of refrigerant for the largest reasonable requirement.

Regarding claim 13, Loprete explicitly discloses the control of the compressor according to the external temperature (see column 26 lines 15-21). It is noted that this is

the reverse of the step claimed, but also that it is for heating mode as opposed to cooling mode, and the equivalent energy efficiency logic applied to a cooling mode will result in a step in which when an external temperature of the refrigerator is lower than a pre-set external temperature, the compressor is rotated counter clockwise; and a step in which when the external temperature of the refrigerator is not lower than the pre-set external temperature, the compressor is rotated clockwise. This would have been obvious to one of ordinary skill in the art at the time of the invention as a simple modification of the system of Loprete et al in order to make it practical for regions less cold than that originally intended for the system to be installed in.

Regarding claim 17, it is noted that the steps of measuring the temperature inside the refrigerator when a door is closed, and again at a predetermined time interval after the closing of the door, in order to determine the rate at which heat was transferring into the refrigerator. However, as the load on a cooling system is determined in heat per unit of time, it would have been obvious to one of ordinary skill in the art at the time of the invention to program the controller of Loprete et al to calculate the load from a single sensor and data gathered over time rather than multiple sensors taking data simultaneously in order to minimize the expense of parts and retain an accurate estimate of the cooling load placed on the system in order to control the compressor in an optimally efficient manner.

Regarding claims 14, 16, and 18, the determination of appropriate pre-set temperatures is a matter of routine experimentation and as such would have been

obvious to anyone of ordinary skill in the art at the time of the invention in order to determine the optimum points to program to maximize efficiency of the system.

Regarding claim 19, it is noted that Loprete does not explicitly disclose a step in which when power supplied to the refrigerator is cut off beyond a predetermined time and then re-supplied, the compressor is rotated clockwise, and a step in which when power supplied to the refrigerator is cut off within a predetermined time and then resupplied, the compressor is rotated in the same direction as a direction of the compressor before the power is cut off. However, as if power is cut off beyond a predetermined period of time, the internal temperature will rise to the point requiring the compressor to be run clockwise, and if power is cut off for less time than that it will not, it would have been obvious to one of ordinary skill in the art at the time of the invention to program the system to do so in order to implement it immediately, rather than waiting for a temperature reading to verify the necessity of cooling the interior.

Regarding claim 20, it falls within the realm of routine experimentation to calculate the optimum time period to optimize efficiency of the system.

Regarding claims 21-23, Loprete et al discloses a protector (208, see column 23 lines 6-11) which detects current, and uses that information to detect if a rotation direction of a rotation direction select signal for rotating the compressor and an actual rotation direction of the compressor are identical; and if the rotation direction of the rotation direction select signal and the actual direction of the compressor are different, the compressor is rotated in a direction opposite to the direction of the rotation direction select signal, because there are only directions in which the compressor can rotate;

further, if the rotation direction select signal and the actual direction of the compressor are the same, the compressor is rotated according to the rotation direction select signal.

Regarding claims 25-27 it is noted that Loprete et al does not explicitly disclose a step in which the compressor of the refrigerator is rotated clockwise during a pre-set time in which the temperature inside the refrigerator reaches near the temperature set by the user, and a step in which when the pre-set time elapses, the compressor is rotated counterclockwise and stopped when the temperature inside the refrigerator reaches the temperature set by the user. However, it would have been obvious to one of ordinary skill in the art at the time of the invention to program it to rotate at the greater compression capacity while the need for cooling was greater, and at the lower compression capacity while the need for cooling was lower, in order to prevent overshoot. It further would have been obvious to one of ordinary skill in the art at the time of the invention to program the controller of Loprete to stop the compressor between directions to prevent overload and damage to the motor, and to stop after the refrigerator had reached the temperature set by the user, again to prevent overshoot.

Regarding claim 28, Loprete discloses the rotation of the compressor in the lower capacity direction until the temperature of the controlled space has reached the desired temperature from a point near the desired temperature, as Loprete discloses the implementation of load matching (see column 26 lines 51-52).

10. Claim 24 is rejected under 35 U.S.C. 103(a) as being unpatentable over Loprete et al (US Patent No. 6,591,621) in view of D'Entremont et al (US Patent No. 5,200,872).

Regarding claim 24, it is noted that Loprete et al did not explicitly disclose the actual rotation direction of the compressor to be sensed through a rotation direction sensor installed at the compressor and the rotation direction sensor to generate a first or second signal according to the rotation direction of the compressor. However, the compressor of D'Entremont et al explicitly discloses the presence of a discharge pressure sensor as indicative of the direction of rotation of the motor (70, see column 2 line 68 and column 3 line 1; see also column 4 lines 44-46) in addition to other sensors. It would therefore have been obvious to one of ordinary skill in the art at the time of the invention to implement the additional sensor of D'Entremont et al in the compressor of Loprete et al in order to provide a failsafe regarding the direction of rotation of the compressor.

Conclusion

11. The prior art made of record and not relied upon is considered pertinent to applicant's disclosure. Kimura et al (US Patent Application Publication No. 2001/0007194) discloses a control device for a variable displacement compressor. Ota et al (US Patent Application Publication No. 2001/0013225) discloses a displacement control apparatus and method for a variable displacement compressor. McGrath (US Patent No. 3,059,448) discloses an air conditioning apparatus with variable capacity compressors. Kountz et al (US Patent No. 4,151,725) discloses a control system for regulating rotating machinery. Smorol (US Patent No. 4,228,846) discloses a control apparatus for a two-speed heat pump. Han et al (US Patent No. 4,689,967) discloses a control and method for modulating capacity of a temperature conditioning system.

Sugiyama et al (US Patent No. 4,783,609) discloses a rotation detecting apparatus for use with a compressor. Sato (US Patent No. 4,796,438) discloses an automotive air conditioning system controller. Hanson et al (US Patent No. 4,903,502) discloses a rate of change temperature control for a refrigeration system. And Herrick et al (US Patent No. 6,272,872) discloses a motor reversal switching system with microprocessor, thermostatic control, and reversible compressor.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEXIS K. COX whose telephone number is (571)270-5530. The examiner can normally be reached on Monday through Thursday 8:00a.m. to 5:30p.m. EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cheryl Tyler or Frantz Jules can be reached on 571-272-4834 or 571-272-6681. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/AKC/

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